Copyright © 1999. The American Academy of Allergy, Asthma & Immunology, Inc. All rights reserved.

The material contained in this publication is the exclusive property of the American Academy of Allergy, Asthma & Immunology, Inc. ("AAAAI") and, as to copyrighted works of others which are contained herein, such other copyright owners. This work is protected under U.S. copyright law and other international treaties and conventions. Except as stated herein, none of the material contained in this publication may be copied, reproduced, distributed, republished, downloaded, displayed, posted or transmitted in any form or by any means, including, but not limited to, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of AAAAI or, as to copyrighted material of others, the copyright owner. Any inquiries regarding such permission should be directed to:

Ms. Amy Stone American Academy of Allergy, Asthma & Immunology, Inc. 611 East Wells Street Milwaukee, WI 53202 Phone: (414) 272-6071

Fax: (414) 272-6070

Certain material in this publication is taken or derived from NIH Publication Nos. 97-4051 (*Guidelines for Diagnosis and Management of Asthma*) (July 1997) and 97-4053 (*Practical Guide for Diagnosis and Management of Asthma*) (October 1997) of the U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Heart, Lung, and Blood Institute.

AAAAI gratefully acknowledges the assistance of the Academic Services Consortium, University of Rochester, in the preparation of this publication.

Permission is granted to display, copy, distribute and download the materials in this publication for personal, non-commercial use only provided that such materials are not altered or modified and AAAAI's copyright notice is displayed thereon.

DISCLAIMER: This publication and the material and information contained herein have been produced for informational purposes as a service to members and the general public and are provided "as is," without warranty of any kind, either express or implied, including, without limitation, implied warranties of merchantability and fitness for a particular purpose. AAAAI shall not be liable for direct, indirect, special, incidental or consequential damages related to the user's decision to use this publication or any material or information contained herein.

Table of Contents

| Introduction | i |
|---|--|
| The goal of this initiative | ii ii iv |
| Epidemiology | 1 |
| Asthma is the most common chronic disorder in children and adolescents. For children with asthma, symptoms can interfere with: Uncontrolled asthma is expensive! Each year asthma in children accounts for: Asthma is a leading cause of school absences. References | 2 3 3 |
| Pathogenesis of Asthma in Children | 7 |
| Asthma is a chronic, inflammatory disorder of the airways. Inflammation in childhood asthma Risk factors and clinical implications of asthmatic inflammation References | 8 9 |
| Natural History | 13 |
| Who gets asthma? Asthma often begins in childhood. Which children develop persistent asthma? Asthma symptoms What precipitates ("triggers") asthma episodes ("attacks") in children? In children over 5 years of age, asthma is frequently associated with allergy. Maternal smoking increases the likelihood of wheezing in childhood. References | 14 14 15 15 15 |
| Diagnosis | 19 |
| How do you diagnose asthma in children? | |
| Diagnosis of children who wheeze with respiratory infections can be difficult Consider asthma in children with repeated diagnoses of: | 21 |
| Consider asthma in children with repeated diagnoses of: Masqueraders of asthma in children Three steps for diagnosing asthma in children 1. Medical history 2. Physical examination 3. Objective measurements When is it asthma? | 21 22 22 22 23 |
| Consider asthma in children with repeated diagnoses of: Masqueraders of asthma in children Three steps for diagnosing asthma in children 1. Medical history 2. Physical examination 3. Objective measurements | 21 22 22 23 23 24 24 24 |

| Tips for working within the time constraints of the typical office visit | 7 |
|--|---------------|
| Component 2 – Controlling Factors Contributing to Severity 49 | 9 |
| Major indoor triggers for asthma (table) 50 Consider allergen immunotherapy for children with asthma when: 57 Viral respiratory infections can exacerbate asthma in children 57 Other factors that can influence asthma severity: 52 Rhinitis/sinusitis 52 Gastroesophageal reflux 52 Sensitivity to aspirin, nonsteroidal anti-inflammatory medications, sulfites, beta blockers 52 References 53 | 1 1 2 2 2 2 |
| Component 3 – Pharmacologic Therapy 57 | 7 |
| A stepwise approach to treating the child with asthma is recommended. Medications to treat asthma in children | 000112334445 |
| Medication Information Tables 70 | 0 |
| Long-Term Control Medications Cromolyn sodium/Nedocromil sodium | 1 2 3 4 4 5 6 |

| | Making the step wise approach to therapy work | 77 |
|----|--|-----|
| | How do you step down long-term control therapy? | 78 |
| | How to help the child regain control of asthma: | 79 |
| | Referral to an asthma specialist is recommended when: | |
| | Treat asthma exacerbations promptly and aggressively. | |
| | Assessing the severity of an asthma exacerbation | |
| | Normal breathing and pulse rates for children (table) | |
| | Risk factors for death from asthma | |
| | Managing asthma exacerbations in the home (schematic) | |
| | Management of asthma exacerbations: emergency department and hospital-based care (schematic) | |
| | Special considerations when treating children with asthma | |
| | Administering asthma medications to infants and children can be challenging | |
| | For children < 2 years | |
| | For children between 3 and 5 years | |
| | For school-age children | |
| | Types of inhalation devices for asthma medications (table) | |
| | Advantages of using spacers and holding chambers: | 87 |
| | The child's schedule and giving asthma medications | |
| | Infants and adolescents have special needs 0 to18 months | |
| | Primary prevention of asthma may alter its course | |
| | Adolescents | |
| | Asthma, inhaled corticosteroids, and linear growth | |
| | Preventing "anticipated" episodes of asthma symptoms | |
| | Managing the child with seasonal symptoms | |
| | Allergen immunotherapy may be considered for children with asthma when: | |
| | Treating asthma symptoms due to viral upper respiratory infections (URIs) | |
| | Managing exercise-induced asthma | |
| | References | 94 |
| Cc | emponent 4 – Patient Education | 101 |
| | Take a proactive approach to asthma education | 103 |
| | and for Treating Asthma Exacerbations | |
| | Identify who needs training. | |
| | Deliver the information in a way that will be easily understood and accepted Children of different ages learn in different ways | 106 |
| | Encourage open communication | 10/ |

| | Focus on what is doable | 107 | |
|---|--|---|--|
| | Some examples of delivery of asthma education by clinicians during | | |
| | patient care visits (table) | | |
| | References | 109 | |
| | Asthma and the School Child | 113 | |
| | The school asthma team | 114 | |
| | Common asthma triggers in the school environment: | 114 | |
| | What do school personnel need to know? | 115 | |
| | Taking medications at school may be difficult. | | |
| | What can you do? | 116 | |
| | Give the physical education teacher and/or coach specific | | |
| | written instructions. | | |
| | Encourage parents to: | | |
| | Be aware of common school problems faced by the student with asthm | | |
| | How Asthma-Friendly is Your School? (handout) | | |
| | School Asthma Management Plan (form) | | |
| | Resource Organizations for Patients and School Staff | 191 | |
| | Resource Organizations for Patients and School Staff | | |
| | References | | |
| | <u> </u> | | |
| | References | 122 125 | |
| | References Barriers to Care and Recommendations for Policy | 122 125 126 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? | 122 125126127 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: | 122 125126127 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? | 122 125126127 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References | 122 125126127128 131 | |
| 1 | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References. | 122 125126127128 131132 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References Interventions Interventions to improve health care for children with asthma Considerations for interventions for children with asthma Outcome measurements in children by major activity and age group (table) | 122 125126127128 131132133)133 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References Interventions Interventions to improve health care for children with asthma Considerations for interventions for children with asthma Outcome measurements in children by major activity and age group (table) How can our health care system better serve children with asthma? | 122 125126127128 131132133133 | |
| | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References Interventions Interventions to improve health care for children with asthma Considerations for interventions for children with asthma Outcome measurements in children by major activity and age group (table) How can our health care system better serve children with asthma? Suggestions for improving resource utilization | 122 125126127128 131132133135135 | |
| 1 | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References Interventions Interventions to improve health care for children with asthma Considerations for interventions for children with asthma Outcome measurements in children by major activity and age group (table) How can our health care system better serve children with asthma? Suggestions for improving resource utilization Suggestions for research | 125 126 127 127 128 131 132 133 133 135 135 136 | |
| 1 | Barriers to Care and Recommendations for Policy What barriers to health care can affect children with asthma? Barriers within the system include: What can you do to overcome barriers to care? References Interventions Interventions to improve health care for children with asthma Considerations for interventions for children with asthma Outcome measurements in children by major activity and age group (table) How can our health care system better serve children with asthma? Suggestions for improving resource utilization | 125 126 127 127 128 131 132 133 133 135 135 136 | |

Childhood is a unique developmental stage in life which shapes adult health.

- There is a continuum of child health into adult health, and conditions arising in childhood often persist into adulthood.
- "Healthy" behaviors and "at-risk" behaviors are molded during childhood.
- While children are dependent on parents and other adults for accessing and receiving health care, adult patterns of health care utilization are influenced by childhood patterns and demographics.

Introduction

Asthma is the most common chronic disease of childhood, affecting nearly 5 million children in the United States. Many children with asthma miss out on school, sports, and other childhood activities. Children with asthma account for almost 3 million physician visits and 200,000 hospitalizations each year. To care for these children, parents take time away from work. The annual health care cost for treating children with asthma is approaching \$2 billion, and another \$1 billion is estimated for the indirect costs associated with caring for these children.

The real impact of pediatric asthma extends far beyond statistics and health care costs. Children's lives and well-being depend on the knowledge and behaviors of their parents, caretakers, and health care providers. To ensure the highest standards of care and levels of information, the American Academy of Allergy, Asthma, and Immunology (AAAAI) in partnership with the National Asthma Education and Prevention Program (NAEPP), coordinated by the National Heart, Lung, and Blood Institute, has launched a comprehensive new initiative – **Pediatric Asthma: Promoting Best Practice**.

The goal of this initiative is to ensure that a broad spectrum of health care providers learns about, understands, and implements clinical and best practice information for diagnosing and managing children with asthma.

The first step toward this goal is the dissemination of recommendations for pediatric asthma care based on the Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma (EPR-2) published by the NAEPP in 1997. The EPR-2 provides substantial information for the diagnosis and management of asthma in adults and children. The pediatric initiative has adapted the EPR-2 into an easily-referenced, user-friendly, pediatric-focused document: *Pediatric Asthma: Promoting Best Practice – Guide for Managing Asthma in Children*. This guide will be disseminated widely to help family practice physicians, pediatricians, nurse practitioners, respiratory therapists, pharmacists, and others who work with children to manage asthma.

The next steps involve conferences to bring together the nation's pediatric asthma experts, researchers, clinicians, managed care administrators, child health advocates, school and sports leaders, community interventionists, and policy makers. The objectives of these meetings are: to focus the public spotlight on pediatric asthma; to create a forum where participants can exchange ideas and experiences with different implementation strategies; and to create opportunities to collaborate on actions to promote best practices in pediatric asthma.

Methods Used to Develop This Document

The AAAAI Organizing Committee established the Pediatric Asthma Committee (the Committee), a multidisciplinary and multi-organizational group of U.S. asthma and health care experts. The Committee includes health professionals in the areas of general medicine, family practice, pediatrics, allergy, pulmonary medicine, nursing, school health care, and health education. Committee members were recommended by the AAAAI Organizing Committee, and other health care agencies and medical societies, and include the following persons:

Co-Chairs:

Gary S. Rachelefsky, M.D., FAAAAI Gail G. Shapiro, M.D., FAAAAI American Academy of Allergy, Asthma and Immunology

Committee:

David Bergman, M.D. American Academy of Pediatrics

Joann Blessing-Moore, M.D. American College of Allergy, Asthma, and Immunology

Carol Costante, R.N., M.S., C.S.N. National Association of School Nurses

Seth Emont, Ph.D.
The Robert Wood Johnson
Foundation

Peter J. Gergen, M.D.

Agency for Health

Care Policy and Research

Meyer Kattan, M.D. American Thoracic Society

Stephen Redd, M.D. Centers for Disease Control

Irwin Redliner, M.D. Children's Health Fund

Stuart Stoloff, M.D. Specialist in Family Medicine

Virginia Taggart, M.P.H. National Heart, Lung, and Blood Institute Division of Lung Diseases

Initiative aims:

- Care for children with asthma will improve.
- Family practice physicians, pediatricians, community clinic practitioners, and health care providers will have an easyto-use guide for promoting best clinical care practices, based on the NAEPP EPR-2.
- Exchanging information on strategies and tactics that work (and those that don't) will prepare health care innovators and advocates to meet the challenges of the increasing number of children with asthma.
- The national spotlight on pediatric asthma will help decrease social and economic barriers to best practice.

The charge to the Committee was to pull together into one easy-to-access document all of the pediatric information in the EPR-2. Emphasis was to be placed on recommendations addressing practical decision-making issues in diagnosis and management; and the intended audience would be clinicians working in diverse health care settings. Each member of the Committee was assigned to at least one section of the EPR-2 with the tasks of selecting key messages from the EPR-2, drafting these messages in writing, and identifying issues for discussion. Following review and revision of the initial manuscript, the Committee met to discuss key issues and added sections, which included Asthma and the School Child, Barriers to Care and Recommendations for Policy, and Interventions. Following this meeting, another draft of the document was reviewed by the Committee. This draft was also reviewed by a panel of outside experts: Howard Eigen, M.D.; Carolyn C. Lopez, M.D.; Marielena Lara, M.D., M.P.H.; Walter L. Larimore, M.D.; Robert Lemanske, M.D.; Diane E. McLean, Ph.D., M.P.H.; Sydney Parker, Ph.D.; Milton Schwarz, M.D. Revisions from the outside reviewers and those received from the Committee were incorporated into a Preliminary Draft Report which was made available for review at the first conference. Pediatric Asthma: Promoting Best Practice – Raising the National Standard of Care for Children with Asthma (May 2-3, 1998; Washington, D.C.). Revisions based on comments to the Preliminary Draft Report were approved by the Committee and then submitted to the NAEPP Coordinating Committee for review and endorsement as a summary of the EPR-2.

NAEPP Coordinating Committee

| Member Organization | Representative |
|--|--|
| National Heart, Lung, and Blood Institute | Claude Lenfant, M.D., Chair |
| | |
| Agency for Health Care Policy and Research | Lynn. A. Bosco, M.D., M.P.H. |
| Allergy and Asthma Network/ Mothers of Asthmatics, Inc. | Nancy J. Sander |
| American Academy of Allergy, Asthma and Immunology | Albert L. Sheffer, M.D. |
| American Academy of Family Physicians | Barbara P. Yawn, M.D., M.Sc. |
| American Academy of Pediatrics American Academy of Physician Assistants | Gary S. Rachelefsky, M.D. Barbara Benske Heier, P.AC. |
| American Association of Occupational Health Nurses | Jane Lipscomb, Ph.D., R.N. |
| American Association for Respiratory Care | Thomas J. Kallstrom, R.R.T. |
| American College of Allergy, Asthma, and Immunology | William Storms, M.D. |
| American College of Chest Physicians | Robert A. Barbee, M.D., F.C.C.P. |
| American College of Emergency Physicians | Richard M. Nowak, M.D., M.B.A., F.A.C.E.P. |
| American Lung Association | Noreen M. Clark, Ph.D. |
| American Medical Association American Nurses Association | Paul V. Williams, M.D. Barbara M. Santamaria, R.N., M.P.H., C.F.N.P. |
| American Pharmaceutical Association | Dennis M. Williams, Pharm.D. |
| American Public Health Association | Pamela J. Luna, Dr.P.H., M.Ed. |
| American School Health Association | Lani S. M. Wheeler, M.D., F.A.A.P., F.A.S.H.A. |
| American Society of Health-System Pharmacists | Leslie Hendeles, Pharm.D. |
| American Thoracic Society | A. Sonia Buist, M.D. |
| Association of State and Territorial Directors of Health Promotion and Public Health Education | Barbara L. Hager, M.P.H., C.H.E.S. |

NAEPP Coordinating Committee

| Member Organization | Representative |
|---|---|
| Asthma and Allergy Foundation of America | Mary E. Worstell, M.P.H. |
| National Association of School Nurses | Vivian Haines, R.N., M.A., S.N.P. |
| National Black Nurses' Association, Inc. | Susan B. Clark, R.N., M.N. |
| National Center for Chronic Disease Prevention and Health Promotion (CDC) | Mary Vernon, M.D., M.P.H. |
| National Center for Environmental Health (CDC) | Leslie P. Boss, Ph.D., M.P.H. |
| National Center for Health Statistics (CDC) | Kathryn S. Porter, M.D., M.S. |
| NHLBI Ad Hoc Committee on Minority Populations | Ruth I. Quartey, M.A., R.R.T. |
| National Insitute for Occupational Safety and Health (CDC) | Gregory R. Wagner, M.D. |
| National Institute of Allergy and Infectious Diseases | Lawrence J. Prograis, Jr., M.D. |
| National Institute of Environmental Health Sciences | Jerry Phelps |
| National Medical Association | Michael Lenoir, M.D. |
| Society for Academic Emergency Medicine | Carlos A. Camargo, M.D., Dr.P.H. |
| Society for Public Health Education | L. Kay Bartholomew, Ed.D., M.P.H. |
| U.S. Department of Education U.S. Environmental Protection Agency | Doris Sligh and Debra Little Mary Smith |
| U.S. Food and Drug Administration | John K. Jenkins, M.D. |
| U.S. Public Health Service | Olivia Carter-Pokras, Ph.D. |

Two sections of this document (Barriers to Care and Interventions) were not part of the EPR-2. The statements in these sections are based solely on review of the relevant published literature, discussion by the Committee, and comments received from attendees at the conference *Pediatric Asthma: Promoting Best Practice – Raising the National Standard of Care for Children with Asthma* (May 2-3, 1998; Washington, D.C.).

In order to achieve the goal of a user-friendly guide, references have been grouped by section and placed at the end of the appropriate text. In summarizing the EPR-2 recommendations for clinical care, the Committee wants to highlight key messages for busy clinicians who care for children. The reader is encouraged to refer to the EPR-2 for more detailed discussion of the scientific literature. A critical point made in the EPR-2 must be emphasized here as well:

The recommendations for care are suggested as guides for making clinical decisions. The clinician, the child, and the parents (and caregivers) must work together to develop individual treatment plans that are tailored to the specific needs and circumstances of the child and family.

It is the hope of the Committee, and those who have reviewed this report, that this initiative will improve health care for children and their families.

Acknowledgments

The Committee acknowledges the support of Merck U.S. Human Health, which provided an unrestricted educational grant for publication costs and for Committee travel expenses. The Robert Wood Johnson Foundation provided support for conference travel scholarships, conference reports, development of a pediatric asthma registry, and publication of journal articles.